Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte KAPIL D. SINGH

Appeal No. 2004-0874
Application 09/239,578[1]

ON BRIEF

Before HAIRSTON, BARRETT, and BARRY, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1-26.

We reverse.

[1] Application for patent filed January 28, 1999, entitled "Method and Apparatus for Reusing Subparts of One Mechanical Design for Another Mechanical Design."

BACKGROUND

The invention relates to a mechanical design reuse method. Modeling representations for the mechanical design are dependent graphs. The reuse method calls for replicating a sub-graph representing a subpart of a first mechanical design and then merging the replicated sub-graph into a graph of a second mechanical design to effectuate reuse of the identified subpart into the second mechanical design.

Claim 1 is reproduced below.

1. In a computer system, a method of operation comprising:

> replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool, the first dependent graph having modeling information of the first mechanical design and the replicated sub-graph having modeling information of a subpart of the first mechanical design; and
>
> merging the replicated sub-graph into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the first mechanical design in the second mechanical design.

THE REFERENCES

The examiner relies on the following references:

Ansaldi et al. (Ansaldi), Geometric Modeling of Solid Objects by Using a Face Adjacency Graph Representation, Proc. of SIGGRAPH '85 Conference on Computer Graphics, July 22-26, 1985, pages 131-139.

Zeid, CAD/CAM Theory and Practice (McGraw-Hill, Inc. 1991), pages 388-437.

THE REJECTIONS

We refer to the final rejection (Paper No. 11) (pages referred to as "FR__") and the examiner's answer (Paper No. 19) (pages referred to as "EA__") for a statement of the examiner's rejection, and to the brief (Paper No. 18) (pages referred to as "Br__") and reply brief (Paper No. 20) (pages referred to as "RBr__") for a statement of appellant's arguments thereagainst.

Claim 24 stands rejected under 35 U.S.C. § 112, first paragraph, for lack of enablement for the limitation of "a first and a second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions." The rejection of claims 1-26 for lack of enablement of "replicating a sub-graph" and "merging the replicated sub-graph" is withdrawn (EA19). The rejection of claims 2-5, 9-12, and 17-20 that was based on the limitation "identifying the sub-graph for replication" is withdrawn (EA21).

Claims 1-7, 25, and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ansaldi.

Claims 1, 2, 25, and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Zeid.

Claims 8-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ansaldi and Official Notice.

Claims 8 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zeid and Official Notice.

OPINION

35 U.S.C. § 112, first paragraph

Appellant argues that the limitation of "a first and a second processor communicatively coupled to each other to correspondingly execute the first and second plurality of programming instructions" in claim 24 is adequately discussed to have enabled one skilled in the art to make the invention. It is argued that the examiner has not met the initial burden of establishing a reasonable basis to question the enablement and that factors, reasons, and evidence to support the rejection should be explained (Br10). It is also argued that appellant submitted evidence showing a multiprocessor Cray supercomputer and a multiprocessor UNIX system (Br10-11).

The examiner's statement that the multiprocessor task scheduling in UNIX optimizes multiple programs running on a multiprocessor computer by running different programs on different processor (EA22) implies that it does not teach running a single program on a multiprocessor computer. The examiner responds that it is a non-trivial task to design a multithreaded software application that can take advantage of multiprocessing and it would require undue experimentation (EA23).

Appellant responds that claim 24 does not preclude the first and second processors running separate programs (RBr2-3). It is

further noted that compilers have been in existence to provide for automatic parallelization of sequential programs (RBr3).

Initially, we agree that the examiner has failed to provide sufficient reasons to shift the burden to appellant to show enablement. The USPTO must support a rejection for lack of enablement with reasons. In re Marzocchi, 439 F.2d 220, 223-24, 169 USPQ 367, 369-70 (CCPA 1971). The factors to be considered in determining whether a disclosure would require "undue experimentation" are summarized in In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). See also MPEP § 2164.01(a) (8th ed., Rev. 1, Feb. 2003). The rejection addresses none of these factors. Although the examiner states that it is a non-trivial task to program a multiprocessor system, the question is whether there would be "undue" experimentation, not whether a lot of work would be required. We agree with appellant that claim 24 does not recite running a single program on two processors (multithreading), but can be met by two processors each running a single program that communicate with each other. We further agree that multiprocessing was well known in the computer art. Considering that the functions to be performed by each processor are well defined by claim 24, and that the examiner does not challenge the enablement for a single processor, we conclude that claim 24 is based on an enabling disclosure. The rejection of claim 24 is reversed.

Anticipation over Zeid

The claims are grouped to stand or fall together (Br4). We agree with this grouping. Although claims 25 and 26 recite replicating and merging a "subset" rather than a "sub-graph," the analysis is the same. We take claim 1 as representative.

The examiner finds that Zeid teaches "replicating," especially at pages 392-393, and teaches "merging," especially at pages 412-413 (FR13; EA7).

Appellant argues that Zeid discloses a Constructive Solid Geometry (CSG) graph, which is a symbolic representation of, and is intimately related to, the modeling steps used by the user to create a model (Br13). It is argued that "Zeid does not suggest or disclose replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool (for the purpose of reusing the corresponding subpart of the first mechanical design in a second mechanical design, by merging the replicated sub-graph into the dependent graph of the second mechanical design)" (Br13).

The examiner finds that the CSG graph is equivalent to the claimed "first dependent graph," in particular, the sub-graphs in Fig. 7-42 are the nodes, e.g., sub-graph S_1 consists of the union of primitives B_1 and B_3, and that some sub-graphs, e.g., B_3 and B_4, are "replicates" of one another (EA25).

Appellant responds that the nodes of the CSG are derived from the primitives themselves and the only items that are "replicated" in the creation of the model of the design are the primitive components and not any portion of the graph. It is argued that there can not be said to be replication of a sub-graph from a first dependent graph as there is no sub-graph when the primitives are duplicated (RBr6-7). It is also argued that there is no creating a copy of the nodes and their linking arcs (RBr7).

Claim 1 requires the two specific method steps of "replicating a sub-graph" and then "merging the replicated sub-graph." An anticipatory reference must teach both of these steps, either explicitly or inherently. See In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981). It is not sufficient that a final graph could have been constructed using these steps, which appears to be the examiner's position in this rejection.

Zeid does not teach "replicating a sub-graph" and then "merging the replicated sub-graph," either explicitly or inherently. The CSG graph is drawn in Fig. 7-42. "A CSG graph

is a symbolic (unevaluated) representation and is intimately related to the modeling steps used by the user." (Page 392.) Since the claims do not define the characteristics of the graph, the CSG graph could be the graph in the claims. First, we disagree with the examiner's finding that the nodes, e.g., B_3 and B_4, are "sub-graphs" and are "replicates" of one another (EA25). "A graph is defined as a set of nodes connected by a set of branches or lines." (Page 390.) A sub-graph is a graph that is part of graph. The nodes in Fig. 7-42 are nodes, not sub-graphs. In addition, nodes B_3 and B_4 refer to a primitive with the same shape, but B_4 is not a replicate (exact copy) of B_3 because it is a translated version. Second, the graph of Fig. 7-42 as a whole represents the claimed "first mechanical design" or the "second mechanical design." If it is a first mechanical design, there is no teaching of "replicating a sub-graph" by copying only part of the graph and reusing it in another design. If it is a second mechanical design, there is no teaching that part of the design was merged from a replicated copy in another design. Third, there is no teaching of "merging the replicated sub-graph [into a second graph]," because there is no replicated sub-graph and there is no second graph into which it is inserted. That is, although the graph in Fig. 7-42 is created by merging (taking the union) of two graphs representing the two halves of the design, there is no evidence that one of the graphs was replicated from

part of another graph. The graph was apparently created as an original design. It is not sufficient that the graph could have been created using the claimed steps. We find that Zeid does not anticipate claims 1, 2, 25, and 26 and the rejection is reversed.

Anticipation over Ansaldi

The claims are grouped to stand or fall together (Br4). We take claim 1 as representative.

The examiner finds that Ansaldi teaches "replicating" and teaches "merging" at Figs. 1-4 (FR9; EA4) and on page 139, col. 1, lines 9-20, and Fig. 2(d) (FR30).

Appellant argues (Br11-12): "Figure 2(d)'s description, unrelated to the discussion on page 139, is discussed in the last paragraph of page 133, column 2. The discussion in these passages focuses on joining two faces f and f' belonging to two different shells s and s'. That is, shell s and shell s' are different shells. Thus there is no discussion of *replicating a sub-graph from a dependant graph of a first mechanical design* of a computer aided design (CAD) tool." It is argued that "Ansaldi does not teach replicating a sub-graph from a first dependent graph of a first mechanical design of a computer aided design (CAD) tool or the merging the replicated sub-graph (of the first mechanical design) into a second dependent graph of a second mechanical design of the CAD tool to reuse the subpart of the

first mechanical design in the second mechanical design" (emphasis omitted) (Br14).

The examiner finds that the two Face Adjacency Graphs (FAGs) for shells s and s' are duplicates of one another, albeit rotated 180°, therefore shell s is a FAG that represents a cube and a rotated cube is still a cube, so shell s' is a duplicate, i.e., a replicate, of shell s (EA27-28). The examiner states that during the process of merging shells s and s', node f' is removed from shell s, thereby reading on "replicating a sub-graph" (EA28). It is stated that it is inherent that the components are merged in order to create the complete product (EA28).

Appellant responds that the fact that there are two FAG representations of a cube does not, absent specific teaching of replicating one cube into another, imply that one cube is a replication of another cube (RBr4). It is argued that removing node f' from the graph does not mean that the resulting graph is a "replicated sub-graph" of the original graph (Rr4-5). It is further argued that merely because something can be recognized as having special topological features as part of its graphical representation, does not inherently teach merging a replicated sub-graph into a second dependent graph (RBr5).

"Fig. 2d depicts the effect of the application of the above operator to two cubic shells." (Page 133.) The shells s and s' are joined at faces f and f' to create a single object. While it

is true that shells s and s' represent the same object, a cube, we agree with appellant that there is no teaching that one cube was replicated from the other cube. Furthermore, in accordance with the "replicating a sub-graph" limitation of claim 1, the cube graph representation would have had to be copied from part of another graph, which is not expressly taught or inherent. Again, claim 1 recites specific method steps. It is not sufficient that the resulting graph "could have" been created in a certain way, unless that way is inherent, which we find it is not. We find that Ansaldi does not anticipate claims 1-7, 25, and 26 and the rejection is reversed.

Obviousness over Zeid and Ansaldi in view of Official Notice

The examiner finds that Zeid and Ansaldi disclose the inventions of independent claims 8 and 16 except that they do not specifically teach the use of a recordable medium having a plurality of programming instructions and the use of a processor (FR15; FR18; FR23-24; FR24-25). The examiner takes Official Notice that it was well known to one of ordinary skill in the art at the time of the invention to store software applications on a recordable medium and to use a processor to execute programming instructions (FR15; FR19; FR24; FR25).

Appellant repeats the arguments made with respect to the other independent claims (Br15; Br16). Appellant does not challenge the Official Notice.

Independent claims 8 and 16 recite "replicate a sub-graph" and "merge the replicated sub-graph," which correspond to the limitations of "replicating a sub-graph" and "merging the replicated sub-graph" in claim 1, which are not taught in Zeid or Ansaldi. The rejection of claims 8-24 over Ansaldi and Official Notice and the rejection of claims 8 and 16 over Zeid and Official Notice are reversed for the reasons stated in the anticipation rejections.

CONCLUSION

The rejections of claims 1-26 are reversed.

REVERSED

KENNETH W. HAIRSTON)
Administrative Patent Judge)
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LEE E. BARRETT) BOARD OF PATENT
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